L Number	Hits	Search Text	DB	Time stamp
1	118	(623/1.23).CCLS.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/20 09:10
2	138	(623/22.18,22.12,22.22,22.23,22.24,23.4).CC	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/20 09:59
3	0	((623/22.18,22.12,22.22,22.23,22.24,23.4).CC and ovoid	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/20 09:59
4	5	623/22.$.ccls. and ovoid	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/20 10:03
5	16	623/$.ccls. and ovoid with head	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/20 10:38
6	2	WO-9521212$.did.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/20 11:11
7	175	ball near3 diameter and 623/$.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/20 11:12
8	103	ball near3 diameter and 623/$.ccls. and (mm or millimeters)	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/09/20 11:13

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	Document ID	R	So	Issue Da	Pag	Ti
1	US 3891997 A		U	19750701	4	Hip-jo
2	US 3965490 A		U	19760629	6	Femora
3	US 4003095 A		U	19770118	4	Trisph
4	US 4030143 A		U	19770621	6	Endopr
5	US 4040131 A		U	19770809	4	Trisph
6	US 4123806 A		U	19781107	9	Total
7	US 4126924 A		U	19781128	6	Socket
8	US 4131957 A		U	19790102	5	Ball a
9	US 4139915 A		U	19790220	5	Artifi
10	US 4178329 A		U	19791211	6	Plasti
11	US 4179758 A		U	19791225	5	Fixati
12	US 4213207 A		U	19800722	8	Artifi
13	US 4355426 A		U	19821026	12	Porous
14	US 4404692 A		U	19830920	10	Center
15	US 4442655 A		U	19840417	11	Fibrin
16	US 4459252 A		U	19840710	12	Method
17	US 4461045 A		U	19840724	5	Artifi
18	US 4491986 A		U	19850108	12	Heart
19	US 4524467 A		U	19850625	11	Appara
20	US 4636218 A		U	19870113	7	Artifi
21	US 4642123 A		U	19870210	11	Ball a
22	US 4655777 A		U	19870407	8	Method
23	US 4668446 A		U	19870526	10	Proces
24	US 4676798 A		U	19870630	10	Socket
25	US 4678472 A		U	19870707	21	Ball a
26	US 4715860 A		U	19871229	7	Porous
27	US 4732152 A		U	19880322	10	Device
28	US 4801301 A		U	19890131	11	Ball a
29	US 4840632 A		U	19890620	13	Hip pr
30	US 4883491 A		U	19891128	6	Porous
31	US 4919669 A		U	19900424	9	Should
32	US 4944759 A		U	19900731	6	Porous
33	US 4950299 A		U	19900821	10	Ball a
34	US 4960427 A		U	19901002	21	Ball a
35	US 4978356 A		U	19901218	21	Ball a
36	US 4983182 A		U	19910108	6	Cerami
37	US 5021063 A		U	19910604		Joint
38	US 5053212 A		U	19911001		Intima
39	US 5061285 A		U	19911029		Enossa
40	US 5098779 A		U	19920324		Carvab
41	US 5152786 A		U	19921006		Lense
42	US 5185177 A		U	19930209		Produc
43	US 5192325 A		U	19930309		Cerami
44	US 5246445 A		U	19930921	13	Device
45	US 5258023 A		U	19931102	19	Prosth
46	US 5336264 A		U	19940809		Situ p
47	US 5397359 A		U	19950314		Metal
48	US 5425761 A		U	19950620	6	Implan
49	US 5469868 A		U	19951128		Method
50	US 5496372 A		U	19960305		Hard t
51	US 5522893 A		U	19960604		Calciu

US-PAT-NO: 4801301

DOCUMENT-IDENTIFIER: US 4801301 A

TITLE: Ball and socket bearing for artificial joint

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Brief Summary Text - BSTX (8):

In order to increase the inherent stability against dislocation of such semi-constrained constructions, it has become conventional to add a cylindrical portion to the hemispherical socket to make it deeper. Although the ball is not physically constrained by the socket by this adjustment, the ball does have further to travel than if just a hemisphere had been used and thus some reduction in the propensity towards dislocation is achieved. Ball and socket joints of this type generally provide an arc or range of motion of approximately 115.degree. when a 28 mm diameter sphere is used and the socket is made a few millimeters deeper than a hemisphere. Larger ranges of motion can be obtained by keeping the size of the arm attached to the ball constant and increasing the diameter of the ball. In this way, the angular extent of the arm relative to the ball becomes smaller. In the limit, if the ball could be made progressively larger and larger, a range of motion of 180.degree. could be achieved. In practice, however, the largest sphere in common use in artificial joints, and in particular artificial hip joints, has a diameter of 32 mm and provides a range of motion of approximately 120.degree.. It should be noted however, that such larger sphere sizes are not universally favored because frictional torque increases with diameter.

Brief Summary Text - BSTX (12):

An example of a constrained artificial joint employing a plastic bearing is shown in Noiles, U.S. Pat. No. 3,996,625. As can be seen in FIG. 1 of this patent, a plastic bearing 17 fitted with a metal reinforcing band (un-numbered) extends beyond the diameter of ball 24 so as to physically constrain the ball within the bearing. The bearing itself is attached of fixation element 12. The metal reinforcing band is assembled over the lip of the opening of bearing 17 after that bearing has been forced over sphere 24. The reinforcing band increases the force required to dislocate the joint. In practice, the design shown in FIG. 1 of U.S. Pat. No. 3,996,625 has been found to provide a range of motion of approximately 85.degree. when a sphere diameter of 28 mm is used and to resist direct dislocating forces of several hundred pounds.

Brief Summary Text - BSTX (14):

A constrained construction using a metal socket bearing is shown in Noiles, U.S. Pat. No. Re. 28,895 (reissue of U.S. Pat. No. 3,848,272). This construction provides approximately a 90.degree. range of motion when the

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	Document ID	K	So	Issue Da	Pag	Ti
1	US 3891997 A		U	19750701	4	Hip-jo
2	US 3965490 A		U	19760629	6	Femora
3	US 4003095 A		U	19770118	4	Trisph
4	US 4030143 A		U	19770621	6	Endopr
5	US 4040131 A		U	19770809	4	Trisph
6	US 4123806 A		U	19781107	9	Total
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9	US 4139915 A		U	19790220	5	Artifi
10	US 4178329 A		U	19791211	6	Plasti
11	US 4179758 A		U	19791225	5	Fixati
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13	US 4355426 A		U	19821026	12	Porous
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15	US 4442655 A		U	19840417	11	Fibrin
16	US 4459252 A		U	19840710	12	Method
17	US 4461045 A		U	19840724	5	Artifi
18	US 4491986 A		U	19850108	12	Heart
19	US 4524467 A		U	19850625	11	Appara
20	US 4636218 A		U	19870113	7	Artifi
21	US 4642123 A		U	19870210	11	Ball a
22	US 4655777 A		U	19870407	8	Method
23	US 4668446 A		U	19870526	10	Proces
24	US 4676798 A		U	19870630	10	Socket
25	US 4678472 A		U	19870707	21	Ball a
26	US 4715860 A		U	19871229	7	Porous
27	US 4732152 A		U	19880322	10	Device
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29	US 4840632 A		U	19890620	13	Hip pr
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39	US 5061285 A		U	19911029		Enossa
40	US 5098779 A		U	19920324		Carvab
41	US 5152786 A		U	19921006		Lense
42	US 5185177 A		U	19930209		Produc
43	US 5192325 A		U	19930309		Cerami
44	US 5246445 A		U	19930921	13	Device
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47	US 5397359 A		U	19950314		Metal
48	US 5425761 A		U	19950620	6	Implan
49	US 5469868 A		U	19951128		Method
50	US 5496372 A		U	19960305		Hard t
51	US 5522893 A		U	19960604		Calciu

bearing 12 consist primarily of ball 10 moving in bearing 12, rather than bearing 12 moving in cup 14. As also discussed above, the frictional torques involved further favor movement of ball 10 in bearing 12. Accordingly, by orienting the axis of rotation of bearing 12 upward in the forward direction, most repetitive motion will occur by movement of ball 10. This is an important advantage because it means that the joint will have low friction in that friction increases with the diameter of the moving member and ball 10 has a smaller diameter than bearing 12. Put another way, by orienting the axis of rotation of the bearing 12 in the manner described above, the joint of the present invention for the great majority of motions of the patient's limb exhibits the frictional behavior of a small ball, e.g. a 28 mm ball, while providing a range of motion corresponding to a large ball, e.g. a 42 mm ball.

Detailed Description Text - DETX (24):

From the foregoing, it is evident that the present invention provides a constrained ball and socket joint which has a range of motion greater than that generally available in artificial joints whether of the constrained or semi-constrained type. Moreover, the present invention provides an artificial joint which can be oriented in the patient to provide low friction movement of a ball of relatively small diameter for most of the patient's repetitive activities. The limiting factor in providing the increased range of motion is the outside diameter of the bearing. Accordingly, within anatomical limits, it is advantageous for the bearing outside diameter to be as large as possible.

Current US Original Classification - CCOR (1):

623/22.18

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	Document ID	R	So	Issue Da	Pag	Ti
1	US 3891997 A		U	19750701	4	Hip-jo
2	US 3965490 A		U	19760629	6	Femora
3	US 4003095 A		U	19770118	4	Trisph
4	US 4030143 A		U	19770621	6	Endopr
5	US 4040131 A		U	19770809	4	Trisph
6	US 4123806 A		U	19781107	9	Total
7	US 4126924 A		U	19781128	6	Socket
8	US 4131957 A		U	19790102	5	Ball a
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10	US 4178329 A		U	19791211	6	Plasti
11	US 4179758 A		U	19791225	5	Fixati
12	US 4213207 A		U	19800722	8	Artifi
13	US 4355426 A		U	19821026	12	Porous
14	US 4404692 A		U	19830920	10	Center
15	US 4442655 A		U	19840417	11	Fibrin
16	US 4459252 A		U	19840710	12	Method
17	US 4461045 A		U	19840724	5	Artifi
18	US 4491986 A		U	19850108	12	Heart
19	US 4524467 A		U	19850625	11	Appara
20	US 4636218 A		U	19870113	7	Artifi
21	US 4642123 A		U	19870210	11	Ball a
22	US 4655777 A		U	19870407	8	Method
23	US 4668446 A		U	19870526	10	Proces
24	US 4676798 A		U	19870630	10	Socket
25	US 4678472 A		U	19870707	21	Ball a
26	US 4715860 A		U	19871229	7	Porous
27	US 4732152 A		U	19880322	10	Device
28	US 4801301 A		U	19890131	11	Ball a
29	US 4840632 A		U	19890620	13	Hip pr
30	US 4883491 A		U	19891128	6	Porous
31	US 4919669 A		U	19900424	9	Should
32	US 4944759 A		U	19900731	6	Porous
33	US 4950299 A		U	19900821	10	Ball a
34	US 4960427 A		U	19901002	21	Ball a
35	US 4978356 A		U	19901218	21	Ball a
36	US 4983182 A		U	19910108	6	Cerami
37	US 5021063 A		U	19910604	6	Joint
38	US 5053212 A		U	19911001	7	Intima
39	US 5061285 A		U	19911029	29	Enossa
40	US 5098779 A		U	19920324	7	Carvab
41	US 5152786 A		U	19921006	19	Lense
42	US 5185177 A		U	19930209	6	Produc
43	US 5192325 A		U	19930309	7	Cerami
44	US 5246445 A		U	19930921	13	Device
45	US 5258023 A		U	19931102	19	Prosth
46	US 5336264 A		U	19940809	7	Situ p
47	US 5397359 A		U	19950314	9	Metal
48	US 5425761 A		U	19950620	6	Implan
49	US 5469868 A		U	19951128	15	Method
50	US 5496372 A		U	19960305	54	Hard t
51	US 5522893 A		U	19960604		Calciu

arranged continuously along the extension line of the base sides of the triangular forms, wherein each triangular form is made by respectively connecting the ends of the base side with the ends of the top side (shorter than the base side) of each fragmental section of the thin sheet using curved lines. The shape of the thin sheet AH7 is almost equal to the shape obtained by unfolding a spherical surface.

Detailed Description Text - DETX (60):
FIG. 29 is a side view illustrating only the above-mentioned acetabular shell body AH1. The acetabular shell body AH1 is roughly a hemisphere with a diameter of 50 mm. From the position 5 mm away from the end surface of the acetabular shell body AH1, an acetabular porous lamination component accommodation section AH9 having a spherical surface with a diameter of 48 mm is formed coaxially with the acetabular shell body AH1. The top end of the accommodation section AH9 is positioned 5 mm below the vertex of the acetabular shell body AH1. In the interior of the accommodation section AH9, an internal ball with a diameter of 45 mm is included, which contacts the bearing member AH5.

Detailed Description Text - DETX (62):
The acetabular shell body AH1 is enclosed by metal molds 01 and 02. FIG. 31 is a sectional view taken on line II--II of FIG. 30. The metal molds 01 and 02 have an external shape obtained by dividing a cylinder measuring 70 mm in outer diameter and 50 mm in height into two pieces on the flat plane including the central axis of the cylinder. Inside the molds, a hemispheric bore 03 with a diameter of 50.5 mm is provided to allow the thin sheet AH7 to be formed around the entire circumference of the acetabular porous lamination component accommodation section AH9. When the acetabular shell body AH1 and ten pieces of the thin sheets AH7 are inserted in the metal molds 01 and 02 provided as described above, and the metal molds are made contact with each other at their division surfaces, the thin sheets AH7 are deformed into a hemispheric form inside the acetabular porous lamination component accommodation section AH9. To make the metal molds 01 and 02 contact with each other, screws can be used to pull the molds. The thin sheets AH6 can also be bent by pressing them against a cylindrical shaft with a diameter of 50 mm beforehand. By heating the thin sheets AH7 to about 900.degree. C. in the vacuum furnace, the acetabular porous lamination component accommodation section AH9 is bonded to the surface of the acetabular shell body AH1. To form a hemispherical porous lamination component, it is not always necessary to use hemispherical surfaces such as those provided in the metal molds 01 and 02, the object for obtaining a hemispherical surface can be attained by partially supporting the thin sheets at about three points.

Detailed Description Text - DETX (63):
FIG. 32 is a side view of the femoral stem AH2. In the middle section of the femoral stem AH2, a femoral stem porous lamination component accommodation

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	Document ID	K	So	Issue Da	Pag	Ti
17	US 4461045 A		U	19840724	5	Artifi
18	US 4491986 A		U	19850108	12	Heart
19	US 4524467 A		U	19850625	11	Appara
20	US 4636218 A		U	19870113	7	Artifi
21	US 4642123 A		U	19870210	11	Ball a
22	US 4655777 A		U	19870407	8	Method
23	US 4668446 A		U	19870526	10	Proces
24	US 4676798 A		U	19870630	10	Socket
25	US 4678472 A		U	19870707	21	Ball a
26	US 4715860 A		U	19871229	7	Porous
27	US 4732152 A		U	19880322	10	Device
28	US 4801301 A		U	19890131	11	Ball a
29	US 4840632 A		U	19890620	13	Hip pr
30	US 4883491 A		U	19891128	6	Porous
31	US 4919669 A		U	19900424	9	Should
32	US 4944759 A		U	19900731	6	Porous
33	US 4950299 A		U	19900821	10	Ball a
34	US 4960427 A		U	19901002	21	Ball a
35	US 4978356 A		U	19901218	21	Ball a
36	US 4983182 A		U	19910108	6	Cerami
37	US 5021063 A		U	19910604	6	Joint
38	US 5053212 A		U	19911001	7	Intima
39	US 5061285 A		U	19911029	29	Enossa
40	US 5098779 A		U	19920324	7	Carvab
41	US 5152786 A		U	19921006	19	Lense
42	US 5185177 A		U	19930209	6	Produc
43	US 5192325 A		U	19930309	7	Cerami
44	US 5246445 A		U	19930921	13	Device
45	US 5258023 A		U	19931102	19	Prosth
46	US 5336264 A		U	19940809	7	Situ p
47	US 5397359 A		U	19950314	9	Metal
48	US 5425761 A		U	19950620	6	Implan
49	US 5469868 A		U	19951128	15	Method
50	US 5496372 A		U	19960305	54	Hard t
51	US 5522893 A		U	19960604	16	Calciu
52	US 5725813 A		U	19980310	4	Proces
53	US 5820632 A		U	19981013	7	Prepar
54	US 5871547 A		U	19990216	12	Hip jo
55	US 5876443 A		U	19990302	11	Struct
56	US 5916269 A		U	19990629	11	Wear r
57	US 5935169 A		U	19990810	28	Bone c
58	US 5938699 A		U	19990817	5	Distal
59	US 5954768 A		U	19990921	7	Proces
60	US 5984922 A		U	19991116	23	Spinal
61	US 5989294 A		U	19991123	10	Ball-a
62	US 6002065 A		U	19991214	8	Kits f
63	US 6005162 A		U	19991221	7	Method
64	US 6010535 A		U	20000104	11	Joint
65	US 6013102 A		U	20000111	46	Device
66	US 6033437 A		U	20000307	15	Pegs f
67	US 6042611 A		U	20000328	23	Ball a

Brief Summary Text - BSTX (13):

A constrained construction using a metal socket bearing is shown in Noiles, U.S. Pat. No. Reissue 28,895 (reissue of U.S. Pat. No. 3,848,272). This construction provides approximately a 90.degree. range of motion when the sphere diameter is 28 mm. In a practical sense, the metal bearing can be said to be non-dislocatable. The force required to extract the metal sphere from the enclosing metal socket bearing is more than several thousand pounds. Accordingly, in use, rather than the metal ball dislocating from the metal socket bearing, any overly severe dislocating leverage will cause the fixation element to be disrupted from the bone in which it has been embedded.

Brief Summary Text - BSTX (66):

When the diameter of the ball is approximately the 28 mm in common use, and the socket bearing wall thickness is approximately 7 mm, the inner diameter of the cup, and thus the outer diameter of the bearing, is approximately 42 mm (28 mm+7 mm+7 mm). This outer diameter for the bearing is larger than the largest diameter sphere commonly used in semi-constrained artificial hip replacements, and thus the present constrained construction achieves a greater range of motion than the semi-constrained construction, and at the same time, restrains the ball within the socket.

Detailed Description Text - DETX (9):

The assembled joint is shown in FIG. 1, where the neck 16 of arm 30 can move through the arc from the position shown to that which is symmetrically opposite. That is, the neck of the prosthesis can move in the plane through lines P--P of FIG. 2 from a position of contact with lower stub pin 34 to contact with upper stub pin 34. When ball 10 has a diameter of 28 mm and the outer diameter of bearing 12 is 42 mm, the arc or range of motion of neck 16 is somewhat greater than 135.degree., depending on the design of the neck 16.

Detailed Description Text - DETX (17):

Projection 50, in combination with aperture 13 formed in outer surface 22 of bearing member 12, serves to constrain the rotation of bearing 12 so as to prevent the bearing from being rotated out of the spherical cavity once the joint is assembled and to limit the rotation of the bearing so as to keep neck 16 just out of contact with the rim of ring 74, e.g., on the order of a half a millimeter above the rim. In particular, bearing 12 can rotate only to the point where polar pin 50 and one of the end walls 52 or 54 of aperture 13 are in engagement. As discussed below, this constrained condition for bearing 12 occurs automatically as the joint is assembled without any additional assembly steps. Also, the constraining of socket bearing 12 within the joint is accomplished irrespective of the angular orientation chosen for retaining ring 74 with respect to body portion 64 of cup 14.

Detailed Description Text - DETX (22):

For hip joints, the possibility of a number of orientations for the axis of

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1	US 3891997 A		U	19750701	4	Hip-jo
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39	US 5061285 A		U	19911029		Enossa
40	US 5098779 A		U	19920324		Carvab
41	US 5152786 A		U	19921006		Lense
42	US 5185177 A		U	19930209		Produc
43	US 5192325 A		U	19930309		Cerami
44	US 5246445 A		U	19930921	13	Device
45	US 5258023 A		U	19931102	19	Prosth
46	US 5336264 A		U	19940809		Situ p
47	US 5397359 A		U	19950314		Metal
48	US 5425761 A		U	19950620	6	Implan
49	US 5469868 A		U	19951128		Method
50	US 5496372 A		U	19960305		Hard t
51	US 5522893 A		U	19960604		Calciu

US-PAT-NO: 4524467

DOCUMENT-IDENTIFIER: US 4524467 A
See image for Certificate of Correction

TITLE: Apparatus for constraining a socket bearing in an artificial joint

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Brief Summary Text - BSTX (7):
In order to increase the inherent stability against dislocation of such semi-constrained constructions, it has become conventional to add a cylindrical portion to the hemispherical socket to make it deeper. Although the ball is not physically constrained by the socket by this adjustment, the ball does have further to travel than if just a hemisphere had been used and thus some reduction in the propensity towards dislocation is achieved. Ball and socket joints of this type generally provide an arc or range of motion of approximately 115.degree. when a 28 mm diameter sphere is used and the socket is made a few millimeters deeper than a hemisphere. Larger ranges of motion can be obtained by keeping the size of the arm attached to the ball constant and increasing the diameter of the ball. In this way, the angular extent of the arm relative to the ball becomes smaller. In the limit, if the ball could be made progressively larger and larger, a range of motion approaching 180.degree. could be achieved. In practice, however, the largest sphere in common use in artificial joints, and in particular artificial hip joints, has a diameter of 32 mm and provides a range of motion of approximately 120.degree.. It should be noted however, that such larger sphere sizes are not universally favored because frictional torque increases with diameter.

Brief Summary Text - BSTX (11):
An example of a constrained artificial joint employing a plastic bearing is shown in Noiles, U.S. Pat. No. 3,996,625. As can be seen in FIG. 1 of this patent, a plastic bearing 17 fitted with a metal reinforcing band (un-numbered) extends beyond the diameter of the ball 24 so as to physically constrain the ball within the bearing. The bearing itself is attached to fixation element 12. The metal reinforcing band is assembled over the lip of the opening of bearing 17 after that bearing has been forced over sphere 24. The reinforcing band increases the force required to dislocate the joint. In practice, the design shown in FIG. 1 of U.S. Pat. No. 3,996,625 has been found to provide a range of motion of approximately 85.degree. when a sphere diameter of 28 mm is used and to resist direct dislocating forces of several hundred pounds.

Brief Summary Text - BSTX (13):
A constrained construction using a metal socket bearing is shown in Noiles.

US-PAT-NO: 4524467

DOCUMENT-IDENTIFIER: US 4524467 A
See image for Certificate of Correction

TITLE: Apparatus for constraining a socket bearing in an artificial joint

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Brief Summary Text - BSTX (7):
In order to increase the inherent stability against dislocation of such semi-constrained constructions, it has become conventional to add a cylindrical portion to the hemispherical socket to make it deeper. Although the ball is not physically constrained by the socket by this adjustment, the ball does have further to travel than if just a hemisphere had been used and thus some reduction in the propensity towards dislocation is achieved. Ball and socket joints of this type generally provide an arc or range of motion of approximately 115.degree. when a 28 mm diameter sphere is used and the socket is made a few millimeters deeper than a hemisphere. Larger ranges of motion can be obtained by keeping the size of the arm attached to the ball constant and increasing the diameter of the ball. In this way, the angular extent of the arm relative to the ball becomes smaller. In the limit, if the ball could be made progressively larger and larger, a range of motion approaching 180.degree. could be achieved. In practice, however, the largest sphere in common use in artificial joints, and in particular artificial hip joints, has a diameter of 32 mm and provides a range of motion of approximately 120.degree..

It should be noted however, that such larger sphere sizes are not universally favored because frictional torque increases with diameter.

Brief Summary Text - BSTX (11):
An example of a constrained artificial joint employing a plastic bearing is shown in Noiles, U.S. Pat. No. 3,996,625. As can be seen in FIG. 1 of this patent, a plastic bearing 17 fitted with a metal reinforcing band (un-numbered) extends beyond the diameter of the ball 24 so as to physically constrain the ball within the bearing. The bearing itself is attached to fixation element 12. The metal reinforcing band is assembled over the lip of the opening of bearing 17 after that bearing has been forced over sphere 24. The reinforcing band increases the force required to dislocate the joint. In practice, the design shown in FIG. 1 of U.S. Pat. No. 3,996,625 has been found to provide a range of motion of approximately 85.degree. when a sphere diameter of 28 mm is used and to resist direct dislocating forces of several hundred pounds.

Brief Summary Text - BSTX (13):
A constrained construction using a metal socket bearing is shown in Noiles, U.S. Pat. No. Re. 28,895 (reissue of U.S. Pat. No. 3,848,272). This construction provides approximately a 90.degree. range of motion when the sphere diameter is 28 mm. In a practical sense, the metal bearing can be said to be non-dislocatable. The force required to extract the metal sphere from the enclosing metal socket bearing is more than several thousand pounds. Accordingly, in use, rather than the metal ball dislocating from the metal socket bearing, any overly severe dislocating leverage will cause the fixation element to be disrupted from the bone in which it has been

embedded.

Detailed Description Text - DETX (11):
In general, cup 14 is approximately a hemisphere. Ball 10 can rotate until neck 16 is almost against the rim of the cup. When the diameter of the ball is approximately the 28 mm in common use, and the socket bearing wall thickness is approximately 7 mm, the inner diameter of the cup, and thus the outer diameter of the bearing, is approximately 42 mm (28 mm+7 mm+7 mm). Accordingly, on an overall basis, the joint functions as if it had a 42 mm ball operating in a cup of hemispherical depth. This gives the joint a range of motion in the plane through lines S--S somewhat greater than 135.degree., depending on the design of neck 16.

Detailed Description Text - DETX (12):
When ball 10 and neck 16 move in the direction of the greater opening in the socket bearing, their motion is limited by contact of neck 16 with webs 106 of bearing 12. That is, the neck of the prosthesis can move in the plane through lins P--P of FIG. 1 from a position of contact with lower web 106 to contact with upper web 106. To allow clearance for the movement of the neck and ball, the flat sides of the stub pins 34 are preferably beveled inwardly as shown at 36. When ball 10 has a diameter of 28 mm, the outer diameter of bearing 12 is 42 mm and beveled stub pins 34 are used, the arc or range of motion of neck 16 in the plane through lines P--P is somewhat greater than 135.degree., depending on the design of the neck 16.

Detailed Description Text - DETX (18):
Projection 50, in combination with aperture 13 formed in outer surface 22 of

bearing member 12, serves to constrain the rotation of bearing 12 so as to prevent the bearing from being rotated out of the spherical cavity once the joint is assembled and to limit the rotation of the bearing so as to keep neck 16 just out of contact with the rim of ring 74, e.g., on the order of a half a millimeter above the rim. In particular, bearing 12 can rotate only to the point where polar pin 50 and one of the end walls 52 or 54 of aperture 13 are in engagement. As discussed below, this constrained condition for bearing 12 occurs automatically as the joint is assembled without any additional assembly steps. Also, the constraining of socket bearing 12 within the joint is accomplished irrespective of the angular orientation chosen for retaining ring 74 with respect to body portion 64 of cup 14.

Detailed Description Text - DETX (23):

For hip joints, the possibility of a number of orientations for the axis of rotation of bearing 12 is used to place that axis in an orientation in which the greater required range of motion is aligned approximately with axis P--P. For example, the axis of rotation can be oriented upward in the forward direction to achieve this result. In this way, almost all of the highly repetitive load bearing motions of the joint will occur along or close to this axis. As discussed above, motions along or near to the axis of rotation of bearing 12 consist primarily of ball 10 moving in bearing 12, rather than bearing 12 moving in cup 14. As also discussed above, the frictional torques involved further favor movement of ball 10 in bearing 12. Accordingly, by placing the axis of rotation of bearing 12 in a favorable orientation, most repetitive motion will occur by movement of ball 10. This gives the joint low

friction in that friction increases with the diameter of the moving member and ball 10 has a smaller diameter than bearing 12. Put another way, by orienting the axis of rotation of the bearing 12 in the manner described above, the joint exhibits the frictional behavior of a small ball, e.g., a 28 mm ball, for the great majority of motions of the patient's limb, while providing a range of motion corresponding to a large ball, e.g., a 42 mm ball.

Current US Original Classification - CCOR (1):
623/19.12

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1	US 20020156531		U	20021024	33	Biomateria
2	US 6443988 B1		U	20020903	32	Mold appar
3	US 20020072803		U	20020613	4	Metatarsop
4	US 20020016624		U	20020207	31	Apparatus
5	US 6306177 B1		U	20011023	32	Biomateria
6	US 20010004710		U	20010621	33	MOLD APPAR
7	US 6248131 B1		U	20010619	10	Articulati
8	US 6217616 B1		U	20010417	9	Elbow pros
9	US 6140452 A		U	20001031	30	Biomateria
10	US 5888220 A		U	19990330	11	Articulati
11	US 5728175 A		U	19980317	15	Artificial
12	US 5674297 A		U	19971007	17	Metacarpop
13	US 4784661 A		U	19881115	11	Total wris
14	US 4597764 A		U	19860701	8	Ossicular
15	US 4385405 A		U	19830531	5	Hip prosth
16	US 4259752 A		U	19810407	4	Endoprosth

US-PAT-NO: 4385405

DOCUMENT-IDENTIFIER: US 4385405 A

TITLE: Hip prosthesis and its method of fitting

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Detailed Description Text - DETX (30):

(1) The upper anchor made of high density polyethylene includes in a singl part 10, a platform 11 for abutment against the femoral head. This ovoid-shaped platform corresponds to the segment of the resected* femoral hea at the upper part of the femoral sphere. The upper part of the femur is show in hatched lines in FIG. 8. The cup is fixed onto this platform mechanically either by using small pins forming a

Current US Original Classification - CCOR (1):

623/22.3